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"Cut Holes and Sink 'em": Chemical Weapons Disposal and Cold War History as a History of Risk

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Abstract: *»'Cut Holes and Sink 'em': Die Entsorgung chemischer Waffen und die Geschichte des Kalten Kriegs als eine Geschichte des Risikos«.* Using the incident of the scuttling of the USS Le Baron Russell Briggs, loaded with roughly 22,000 tons of outdated chemical weapons in 1970, this contribution extrapolates how, why, and when in the United States chemical weapons that had been produced as the ultimate answer to the risk of nuclear war became reframed as a risk themselves. The analysis settles on how questions of knowing and not-knowing about potentialities of future events influenced these renegotiation processes between the myriad actors involved such as the US military, politicians, environmentalists, Anti-Vietnam activists, and the American public. Beyond analyzing historic examples of risk assessment and management, this contribution also demonstrates how we can read the history of the Cold War as a history or risk. I argue that studying the controversy of operation CHASE 13, the sinking of the SS L. B. Briggs, from a risk perspective opens up new avenues into understanding the Cold War from a social and cultural perspective while integrating political and environmental history.

Keywords: Chemical weapons, Cold War, environment, ocean dumping, Operation CHASE, chemical warfare.

1. Introduction

It was already late afternoon when the USS Le Baron Russell Briggs finally sank. On August 18, 1970, US military aboard the USS Hartley watched for almost six hours how the aging liberty ship slowly made its way 16,000 feet downwards into its ocean grave. Meanwhile, a military airplane circled the site of the sinking. A member from the US Naval Photographic Centre filmed the scuttling of the old liberty ship and produced one of the few unclassified archival records from this navy mission. The silent movie shot through the windows of the plane exhibits scenic images of a bright summer's day out on the calm Atlantic. The audience sees how gradually and with its hulk upfront, the military ocean liner sinks majestically deeper and deeper until she is calmly

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swallowed by the waves of the ocean (Department of Defense, Department of the Navy, Naval Photographic Center, August 18, 1970).

Little does this peaceful imagery convey the grave potential hazards for human health and maritime environment contained in this ship's scuttling. As this contribution extrapolates, "risks," understood as how people positioned themselves vis-à-vis hazards, are not always clear-cut. In this case, the objects of risk are buried deep inside the sinking liberty ship. On its final voyage, the Le Baron Russell Briggs was loaded with 418 coffins, roughly 22,000 tons, of lethal nerve gas weaponry the US Army had classified as unfit for further usage or storage. Originally produced as part of an escalated retaliation strategy of the US military, those chemical weapons had been stored in large numbers to keep America "safe." Over the years of a Cold War scenario of military threat to contain actual (nuclear) combat, however, they started rotting away and eating through their corroding containers. By the mid-1960s, many of those weapons had become unsafe to store and turned into hazardous waste that now awaited its disposal. The scuttling of the SS L. B. Briggs was the last operation within a series of highly controversial toxic waste ocean disposal programs of the US Navy between 1964 and 1970. With these missions, the US military got rid of unwanted hazardous material, primarily outdated chemical munitions, on old ships which it then scuttled at sea. Its code name CHASE stood for "Cut Holes and Sink 'Em" (Ross and Amter 2010, 161).

While the US Navy had successfully managed to keep previous CHASE missions secret and unobserved from US media, politicians, and the public, information about mission CHASE 13 leaked out in the summer of 1969. Congressman Richard D. McCarthy, a Democrat from the state of New York, made them public and so unleashed a national and international debate on the storage and disposal of chemical weapons, in particular, and the practice of dumping toxic waste in the world's oceans in general. Over the course of 1969 and 1970, the incident forced the American public, politicians, military, media, and scientists to reconsider their positions towards the multiple, and even contradictory, natures of the United States chemical weapons stockpile. How much "risk" were they each willing to take to keep America "safe"?

This contribution extrapolates how, why and when those chemical weapons that had been produced as the ultimate answer to the risk of nuclear war, became reframed as an object of risk themselves. The analysis settles on how questions of knowing and not-knowing about potentialities of future events influenced these re-negotiation processes between the myriad actors involved. Yet, beyond extrapolating historic examples of risk assessment and management, this contribution also demonstrates how we can read the history of the Cold War as a history or risk. Studying the controversy of operation CHASE 13 from a risk perspective opens up new avenues into understanding the Cold War from a social and cultural perspective while integrating political and environmental history. It does so in three important ways.

First, risks are inherently material and so was the Cold War. With this claim, I am drawing from environmental history with its strong focus on the natural in narrative and methodology. In terms of narrative, scholars increasingly point to a linkage of cold war and environmental history, in particular during the 1960s and 1970s. In the context of Operation CHASE 13, the rise of environmentalism in the United States during the 1960s and 1970s informed and enabled protests against the ocean dumping and also enriched processes of re-evaluation risk potentialities. As Adam Rome has shown, the military operation falls into a period in US environmental history which had seen the shift from conservationism to environmentalism, the growth of grass-roots activism; and a general rising awareness for themes of pollution and environmental protection (Rome 2001). Spurred on by Rachel Carson's best-selling publication *Silent Spring* in 1962 and framed by the Santa Barbara Oil Spill in 1969, Americans increasingly voiced their concerns about their environment (Carson 1964; Ross and Amter 2010, 159; Matthew 2013). Additionally, I see Operation CHASE as one of the incidences that pushed for what Rome and also Keith Woodhouse have identified as the marriage of environmental and anti-Vietnam protest groups over a common cause in the 1960s and 1970s (Rome 2003; Woodhouse 2009). Both groups met in their realization that the storage of chemical weapons as well as their dumping into the Atlantic was risky as both of these forms of Cold War weapon management could have hazardous consequences.

In terms of methodology, my story exemplifies the intricate linkage of environmental materiality and Cold War politics, as John McNeill and Corinna Unger have pointed to in their edited volume *Environmental Histories of the Cold War* (McNeill and Unger 2010; similarly Closmann 2009; Tucker and Russell 2004). Indeed, archival records as well as the environment itself push scholars to re-read Cold War history also as an environmental history. Written as well as living material gives away how militaries employed environmental warfare such as the deliberate destruction of crops, trees, animals, water supplies, and so forth. Archival records uncover ambitions to change the direction of ocean currents or alter weather patterns for the benefit of military success. Governments built dams for practical as well as symbolic reasons, tested nuclear weapons which left a million-year human footprint, and employed environmentalism as a form of Cold War diplomacy. Clearly, as Unger and McNeill point out, "the Cold War was fought on Earth in the biosphere with repercussions that will last for perhaps a hundred thousand years" (McNeill and Unger 2010, 3). The Cold War and the globe's natural environment, and with it a distinct materiality that from an anthropocentric perspective either posed or was "at risk," were intricately linked. Although a "cold" war, militaries around the world fought their battles with hazardous material that posed a risk to the world's citizens, their livelihood and their environment on a daily basis.

The Cold War, secondly, is also a story of risk management. As Arwen Mohun points out, risks describe a potentiality, a future event that might or might

not happen (Mohun 2013). A history of risk so deals on the one hand with precautionary systems put in place, and with debates assessing the risk potentialities in need of governance on the other hand. In the case of Operation CHASE 13, the materiality of those Cold War hazards evoked fierce debates on degrees of riskiness and risks assessments between 1969 and 1970. Actors debated the likelihood of an unwanted explosion of or environmental pollution from the chemicals in their corrosive containers. On a political level, nationally as well as internationally, the ocean dumping controversy gave incentive for governments to pass national and international environmental legislations. In the United States, President Richard Nixon established the Environmental Protection Agency (EPA), banned ocean dumping, and re-submitted the Geneva Convention on chemical warfare – albeit unsuccessfully – to the US Senate for approval. Internationally, the UN community drafted and passed the London Dumping Convention to protect the maritime environment from hazardous dumpings and ignited debates to reconsider the usage and storage of chemical-biological weapons (CBWs) across the Iron Curtain.

Scholars have used later incidences of chemical weapon disposal occurring in the 1980s and 1990s in the United States to analyze the relationship between democratic governments and citizen activism with regards to political governance. According to sociologist Robert Futrell, there existed a "participatory challenge" as US citizens increasingly pushed to be included in decision-making processes concerning environmental regulation. The US government, in turn, rather followed expert opinion from scientists. They took matters to be too complicated for non-experts to understand (Futrell 2003). The participatory challenge, according to Futrell, and similarly Velma Campbell and Ross Vincent, was how to integrate demands of participation from citizen activists into political frameworks shaped by technocratic arrangements of governance when facing complex questions of science and technology (idem; Campbell and Ross 1995).

Similar dynamics of a "participatory challenge" were at work during the 1960s and 1970s, when politicians like Richard D. McCarthy and Edward Muskie alongside citizen activists rallied against the dumping of these outdated chemical weapons into the Atlantic. The challenge, however, lay not only in how to include citizens and make them understand complex technocratic processes of governance, but how to tend to their controversial views – often contradicting "expert" opinion – on the matter on the table. Consensus usually existed on the materiality of the hazards in question, not on their potentiality. Moreover, the question on the likelihood of an accident or damage was not easily answered scientifically.

Finally, risk as a category helps us understand the Cold War during the 1960s and 1970s as a highly ambivalent conflict oscillating between risk and safety. Scholars have long pointed to this ambiguity when discussing Richard Nixon's Presidency under the premises of the madman theory. Nixon's administration drafted US foreign policy based on the attempt to make other govern-

mental leaders around the world believe, Nixon was mad and his behavior irrational and volatile. This, according to their rationale, should keep America safe. Likelihoods of nuclear war were portrayed to be at odds, and strategists like Henry Kissinger hoped that no enemy, in particular none from the Eastern bloc, would be willing to take the risk of unleashing a madman (Welch 2005; Burr and Kimball 2015; Weiner 2015). Similarly ambiguous was the employment of lethal chemical weapons for storage to keep America safe. These weapons were designed to kill, to hurt, and to harm human life. Any interaction with them was inherently dangerous. At the same time, they were the backbone for creating a sense of "safety" for the American nation facing the omnipresent "risk" of a nuclear war. During the Cold War in particular, these weapon stockpiles' sole purpose of existence was to protect the Americans and the 'free world' as part of a retaliation policy (Price 1995). But these weapons could neither be stored indefinitely, nor was their storage easily safe. When protests occurred over the disposal of these weapons, two discourses of risk and safety focusing on the same object clashed. In the end, it was the US military that needed to figure out how to re-integrate the two and make risks seem controllable (Payne 2001; Burr and Kimball 2015).

In my narrative on Operation CHASE 13 as a Cold War history of risk, I move from a section on the materiality of chemical weapons to how Congressman Richard D. McCarthy uncovered the military's disposal plans, before I end with an analysis on the difficulties of assessing potentialities and likelihoods of hazardous futures. In my conclusion, finally, I will foreshadow future controversies on chemical weapon disposal to illustrate the re-occurrence of certain trends and topics in a history of risk.

2. Chemical Weapons as Hazards of the Cold War

Chemical weapons, or rather the organic phosphorus compounds they contain, pose one of the greatest dangers to human life in the twentieth century. If inhaled or absorbed through the skin or eyes, even the smallest amount of these substances can kill in minutes. If stored improperly, those organic phosphorus compounds quickly contaminate their environment. Eating through their corroding containers and then leaking into the soil, ground water, or ocean space, they kill crops and wildlife. Additionally, they pollute the air and carry their lethal character downwind. Throughout history, there never existed doubt about their hazardous character. Based on their extreme toxicity and military appropriate physical and chemical properties, they became important to military strategy during the Cold War (Environmental Protection Agency 1973, 231).

The United States had been stockpiling unitary and binary chemical weapons since World War I. These consisted chiefly of three different types, namely mustard gas and the two organic phosphorous nerve gas agents, GB (also known as

Sarin gas) and XV. Mustard gas is the 'oldest' chemical warfare agent. It is a blister agent that creates chemical burns. If inhaled, mustard gas can cause a fatal outpouring of liquid into the lungs, so-called pulmonary edema. European scientists discovered the nerve gas agents GB (Sarin) and VX in the 1930s and 1950s. These warfare agents destroy the nervous system. GB is quite volatile and kills within minutes of inhalation; VX is a colorless and odorless liquid and less volatile. It is lethal when inhaled as a vapor or when absorbed through the eyes or skin contact (Tanzman 1994; Marrs, Maynard and Sidell 2007; Statement of Dr. Ivan L. Bennett, Ninety-First Congress 1970, 59-60).

Militaries produced organic phosphorus chemical warfare agents as liquids, as sprays, and as aerosols. With these chemical weapons, long-lasting contamination of the atmosphere would have been possible due to their volatility, their good aerosol properties, and their high toxicity. Both BG and VX can be used as aerosols under all meteorological conditions. Their period of effectiveness even increases with decreasing temperature. Under favorable meteorological conditions, the detonation or vaporization cloud of these chemical warfare agents may spread up to 30 kilometers from the point of origin. Beyond that range, concentrations may still be present in a concentration that leads to combat incapacity (EPA 1973, 232). In the 1960s, scientists assessed the V agents to be "several hundred times more toxic than the most lethal chemical weapons before the advent of the nerve gases" (Cookson and Nottingham 1969, 221). By their chemical set-up, these weapons were efficient, toxic, and lethal instruments of mass destruction.

Ironically, the use of chemical weapons during World War I led to their over-production and stockpiling on a grand scale after World War II. All major powers, including the United States, had used chemical weapons in the First World War. During that conflict, over one million men were wounded by gas, with 90,000 or more fatalities. Vivid news accounts on the impacts of mustard gas usage on soldiers, civilians, and the environment triggered fervent international public outcry over such "uncivilized" warfare immediately after the war (Campbell and Ross 1995, 115). Even decades later, in the age of nuclear weapons, to most Americans "poison gas [still] seemed more terrible and barbaric than tanks, machine guns, long range artillery, aerial bombing and submarine" (Muskie 1969). As early as 1925, the international community established the Geneva Protocol that forbad the first use of these weapons in combat (Krass 1997; United Nations 1925). When, during World War II, combatants managed to avoid the usage of poison gas, the American public was "lulled into thinking that poison gas would not be used again," according to Democratic Senator Edward Muskie when rallying for a ban of chemical weapons (Muskie 1969). Yet, the Geneva protocol did not eradicate chemical weapons. Rather, the protocol's barring of first use led to an almost paradox system. Nations on both sides of the Iron Curtain started stockpiling chemical weapons, simply because "the other side might have it" (Bennett, Ninety-First Congress 1970, 64). In

case the other party would strike first, military strategists argued, they wanted to be ready to retaliate-in-kind (or more). If attacked by chemical weapons, they wanted to be at least able to impose upon an enemy (that was obviously prepared for it with gas-masks because he struck first) "the handicap of operating in a toxic environment" (Bennett in Ninety-First Congress 1970, 64).

Over the course of the Cold War, this logic of deterrence prevailed. Chemical weapons, alongside nuclear weapons, were produced and stored in order to prevent their usage. Military strategists argued for the importance of the art of coercion, of intimidation, and deterrence. According to historian Thomas Schelling, at the time, a nation's military strength was evaluated in its capacity to harm another state. Bargaining power was derived from the ability to hurt without making use of it. The art was to influence another state's behavior by its anticipation of the employment of force only. Deterrence was most successful when the power to hurt was held in reserve (Schelling 1966). Consequently, chemical weapons, alongside nuclear weapons, became the pillars of Cold War military strategies of deterrence and a policy of escalated retaliation.

Entrenched in this logic of deterrence and escalated retaliation, the US Army was, by the 1950s, producing thousands of gallons of organophosphorus agents. Its stockpiles contained mortar and howitzer shells, bombs, and landmines, all filled with mustard gas, Sarin (GB), or XV gas. It also used the deadly liquids to fill the warheads of perhaps as many as 100,000 M-55 rockets (EPA 1973, 232; *New York Times* 1981). Between 1961 and 1969 alone, the US military spent $2 billion dollars on its chemical weapon stockpile (Ninety-First US Congress 1970, 3). In the 1960s, President Kennedy gave orders to store these chemical weapons on American military bases all around the world. In the Pacific region, they could be found on Okinawa, a Japanese island then under American jurisdiction as well as Johnston Atoll, an American military base close to Hawaii. In Europe, American military stored those weapons primarily in Western Germany. Additionally, eight sites on US continental soil in Utah, Arkansas, Oregon, Colorado, Alabama, Maryland, Indiana, and Kentucky were home to these chemical weapons. Over the years, Anniston, Alabama, became the largest site of chemical weapons in the Western world (*New York Times*, August 9, 1970).

Starting after World War I, militaries throughout the world had to learn how to manage these stockpiles of chemical weapons that started piling up on the home front. Because of their chemical nature, these weapons could not be stored indefinitely. Rather, they were ticking time bombs. While Cold War armies were building up immense stockpiles of chemical weapons, military officials also had to meet the challenges of unserviceable weapons due to improper storage, technologically outdated weapons due to changing technological standards (for instance when chemical weapon design moved from unitary to binary weapons in the 1970s), or massive stockpile increases after victorious nations took over their enemies' stockpiles. The greatest danger of these weapon stockpiles resulted from leakages through corrosive aluminum walls or from

unwanted explosion on site. In contrast to modern binary chemical weapons, which require two components to be mixed before they become lethal, up until the 1970s, chemical weapons were manufactured containing unitary chemicals – fully potent and deadly in their aging containers (ibid.; Smothers 1994). By the mid-1960s, tons of chemical weapons had transitioned from serviceable to unserviceable and so from weapon to waste.

Up until the early 1970s, the world's militaries' standard procedure for removing outdated or unwanted chemical weapons from their stockpiles was to dump them in the oceans. Over the course of only few decades, they so filled the Baltic Sea, the North Sea, and the Atlantic, in particular, with tons of poison gas containers, sometimes at shallow depths and close to shore. After World War II, for instance, the Allied powers seized nearly 300,000 tons of chemical weapons from the National Socialists alone and simply dumped them in the oceans. Under the heading Operation Davey Jones Locker, the US military sank 30,000 to 40,000 tons of these poison gas containers into Scandinavian waters between 1946 and 1948. Another 46,000 tons were dumped into the Baltic Sea. Similarly, also the Soviets discarded some of their munition in wooded cases in Baltic waters. In the late 1940s, the British sank 34 shiploads with 127,000 tons of chemical and conventional weapons in the Norwegian Trench and dumped other hazardous loads at a site 20 miles west of Ireland. In the mid-1950s, the British scuttled three large merchant ships with nerve and mustard gas agents off the Outer Hebrides and Northern Ireland in an operation known as "Operation Sandcastle." One of the biggest post-World War II ocean dumpings in American waters occurred off the coast of South Carolina. Between 1946 and 1948, the US military sank about 15,000 tons of German-made nerve gas bombs and US made lewisite bombs unceremoniously into the ocean. Many more ocean dumpings followed in the early Cold War years (Christianson 2010, 133; US Army Research 2001).

An iron curtain of secrecy covered all these missions. None of the military officials ever informed local fishermen or checked to determine what damage had been caused. Furthermore, for years, the militaries did not keep records of what and how much they dumped where. To this day, marine biologists have not determined where all these dumpings took place or what its effects were or still might be (Christianson 2010, 134). Still, for decades, ocean dumping remained the preferred method of disposal. Little did politicians, the media, or the public seem to care about the potential hazards for human life and environment involved in this disposal method – as long as it kept America safe.

3. Changing Tides: Chemical Weapon Disposal as a Risk for the American Home Front

Up to the late 1960s, the hazards involved in the storage and disposal of outdated chemical weapons was apparent to US military personnel. It seemed manageable, though. Other actors, politicians, the media, and the US public, did not seem to pay much attention at all to the risks involved in the established system of chemical weapons management. Throughout the 1960s, as Senator Muskie wrote in a letter published in the *Boston Globe*, Members of Congress were only "vaguely aware" of the chemical warfare research and development programs, "but regarded them as contingency operations (1) to deter other nations from using such weapons first, and (2) to aid in research on countermeasures" (Muskie 1969). Similarly, civilians living near those army bases serving as storage base for the chemical weapons stockpile remained relatively unaware of their proximity to danger. In an interview from 1994, Curtis Penny, one of 300 civilian employees responsible for the chemical stockpile at Anniston Alabama, recalled an utter obliviousness among the US public. This was even true for army employees monitoring the outdated chemical weapons, such as Curtis Penny. Neither Penny nor any other of his colleagues would talk much about their work monitoring thousands of containers of deadly chemicals. Their daily tools of trade required them to wear protective clothing, carry a gas mask, and a syringe full of atropine. In case one of those containers leaked their deadly contents, they would have had to inject the heart stimulant immediately if they wanted to survive. Still, there was utter silence (Smothers 1994).

Despite this silence, according to Curtis Penny, "everybody must have known of the chemicals stored" at the place. People "just didn't like to think about them" (Smothers 1994). Even more so, as gas and germ warfare or any sort of usage of these weapons "seemed a subject for science fiction," according to Senator Edmund Muskie (Muskie 1969). The likelihood of a hazardous future seemed very far away to most Americans. Another reason for such risk negation among the citizens surrounding the Army's outdated chemical weapon depots was economic, according to Penny. Since the Army had first come to Anniston, Alabama in the 1950s, the depot and Fort McClelland, a center for research of chemical and biological weapons, had come to form the economic bedrock of the region. People there grew to "trust and depend on the Army" (Smothers 1994). For them, the military well handled the risks involved in the storage and disposal of chemical weapons.

This assessment of the weapon stockpiles' riskiness changed dramatically at the end of the 1960s. Then, the chemical weapon stockpile turned from a risk for the Cold War enemy only to an environmental and health risk for the whole American nation. The Cold War, with its hazards, had arrived at the home front. At the time, events pointing to the uncontrollability of these chemicals

overlapped with the emergence of environmentalism as a mass movement in the United States. The increase of outdated weapons, moreover, forced the military, too, to reconsider its disposal mechanisms. In mid-1969, the situation culminated in a big public and political outcry over the management and disposal of those chemical weapons rotting away.

First, environmentalism's move into the center of the American society provided the backbone for the ocean dumping scandal over CHASE 13 to erupt. Throughout the 1960s, Presidents John F. Kennedy and Lyndon B. Johnson had made the environment part of their political agenda. Kennedy, for instance, supported new federal programs to assist the acquisition of open space through local and state governments and endorsed measures to preserve wilderness. In 1962, he hosted a White House conference on conservation. Johnson chose to put even more emphasis on the environment than Kennedy. In his May 1964 speech on the Great Society, his first on this political framework, he weaved environmental aspects with the abolition of poverty and racial injustice (Rome 2003, 533). After all, America was not only the strong and the free, but also "America the beautiful" (Johnson 1965, 704-5). This beauty was at danger. America's Great Society, according to Lyndon B. Johnson, would also be a place "where man [could] renew contact with nature." At the same time, citizen action groups, such as women activists, increasingly engaged with the environment. Numbers of environmental articles rose exponentially between 1950 and 1960 and membership numbers of the Sierra Club, the oldest environmental action group in the United States, and others like it doubled and tripled. Finally, by the late 1960s the environmental cause also attracted millions of people in their teens and twenties. This helped make environmentalism a mass movement embraced by young and old. In such a setting, debates over the use of tear gas, defoliants, and napalm in Vietnam framed what was about to come and linked Cold War policies with an environmental agenda (Rome 2003, 527, 541).

Second, at the end of the 1960s, vigorous public complaints against the use and storage of chemical and biological weapons erupted with news of dangers from testing and disposal. The most prominent incident was the death of over 6,000 sheep in Utah, near the Dugway Proving Testing Ground. In spring 1968, an army plane flying over the testing ground had released the nerve gas XV for testing purposes. Wind, however, carried the gas down range to where large herds of sheep grazed. For weeks throughout 1968, military secrecy cloaked the cause of the deaths of these sheep. Official and unofficial investigations followed and by 1969, the military agreed to pay for the sheep. It never admitted any sort of guilt. Documentation of the Dugway case, according to *Chicago Tribune* journalist Gordon Harrison, left the American nation "blinking at its double image: a great democracy boasting of itself as defender of humane and civilized values and all the while developing, testing and stockpiling gas weapons that the conscience of the world had long ago at Geneva agreed to outlaw" (Harrison 1969). Incidents such as the dead sheep in Utah, so it seems, height-

ened politicians' as well as the public's awareness for the hazards involved in the US chemical weapon stockpile.

Finally, in connection with its increasing engagement in Vietnam, also the US military paid greater attention to its chemical weapon stockpile throughout the 1960s. In late 1963, just prior to the US military build-up in South East Asia, authorities of the US Army sent inquiries to the Bureau of Naval Weapons concerning the condition of the expendable ordnance. The Bureau undertook a surveillance program to determine to what degree the chemical weapon storage had deteriorated and discovered several leakages. This increased the request for shipments of deteriorated explosives to the deep water preparation site. In addition, the closing of the Naval Ammunition Depot at Hastings, Nebraska, had generated large amounts of outdated chemical weapons that awaited disposal (Kurak 1970, 23378). During a later government inquiry, NSA scientists similarly found, alone at Rocky Mountain Arsenal in Denver, Colorado, one of the production sites of the CW rockets, 21,000 leaky nerve gas bomb clusters. Citing such unforeseeable incidents as a sniper's bullet, the scientists stated that they could not "exclude the remote possibility of a catastrophic explosion" which could cause "casualties far beyond the capacity of the attendant medical staff to handle" (*Science News* 1969, 26). For insiders of the military, it was obvious already by the mid-1960s that the US Army had, in the words of the magazine *Science*, "a tiger by the tail" (Selin and VanDeveer 2013, 499). This increasing number of outdated weapons had to go somewhere – and fast.

As mentioned earlier, up to this point the military's standard procedure for removing outdated or unwanted chemical weapons from their stockpiles was to dump them in the oceans. Covering 70 percent of the earth's surface, maritime space easily allowed for an out-of-sight, out-of-mind policy, particularly well-suited to cover-up militarization's most toxic remnants (Park and O'Connor 1981, 4). Military officials throughout the world simply presumed that the "vast, cold ocean was the safest place to discard it." Military scientists thought that "the action of the seawater would eventually render the chemicals inert" (Christianson 2010, 134). It seems as if they were oblivious to the damage or potential risks the ocean dumping could cause to humans and marine life for generations to come. In the summer of 1969, Acting-Assistant Secretary of the Army, Charles L. Poor, confessed before Congress that the military had always looked on the ocean floor "as a kind of 'Davey Jones Locker' remote and inaccessible where 'things could be put and forgotten'" (Selin and VanDeveer 2013, 499). Not being infected by ideas of conservation and nature preservation as they were discussed by American environmentalists on a large scale at the time, the US military was not to give up maritime space as perfect disposal site. Facing large numbers of toxic waste, however, it changed its disposal procedure to make disposal faster.

Up until the mid-1960s, the standard procedure of chemical weapon ocean dumping was to load chemical weapons into containers and add sand or cement

for additional ballast. The containers were then loaded onto a ship, transported to the dump site, and manhandled over the site. Costs for this rather cumbersome disposal method were estimated at about $78,000 per ton. The rapid build-up of outdated chemical weapons awaiting disposal in the mid-1960s soon indicated that the US Army, and similarly other militaries around the world, had to find a faster and cheaper large-volume method of disposal. The first inspiration for Operation CHASE, the scuttling of entire ships loaded with outdated chemical weapons, came from a similar incident in 1958, when the US Army had had to get rid of 8,000 tons of mustard gas and lewisite chemical warfare gas. It then loaded the gas onto the SS Wm. Ralston, towed her to sea, and scuttled her there. In the mid-1960s, the US revived this ocean dumping practice of sinking entire ships with operation CHASE, an acronym for "cut holes and sink 'em." Although missions were not running smoothly – the second CHASE ship, the SS Village, for instance, exploded five minutes after she sank in 1964 – news did not leak or concern about these missions was not voiced until CHASE 13 – the sinking of the SS L. B. Briggs in the summer of 1969 (Kurak 1970, 23378). Then, the secretive dumping of more than 21,000 M-55 rockets and other chemical weapon material in the Atlantic caused a national and international scandal. It nearly brought the United States before the international High Court of the Seas and fueled the country's national crisis of anti-Vietnam protests. It ended with a re-assessment of Cold War risk represented in these weapon stockpiles originally meant to keep America safe.

4. Uncovering a Hornet's Nest: Richard D. McCarthy and Operation CHASE 13

The course of events started in early May 1969, when Congressman Richard D. McCarthy, a Democrat from the state of New York, uncovered information about CHASE 13 and decided to drop the political bomb. At the time, McCarthy had been investigating the US military's chemical weapon policy for some time. In January 1969, he had published his book *The Ultimate Folly*, a political treatise of opposition as well as a report on chemical and biological warfare by the United States (McCarthy 1969). According to *Chicago Tribune* journalist Harrison, it had been a news report on the Dugway incident that triggered McCarthy's curiosity. Feeling disturbed about the dead sheep in Utah and simultaneously unknowledgeable of the military doings, he decided to dig into it (Harrison 1969). In May 1969, McCarthy learned about US military plans to move 22,000 tons of poison gas munitions from various army arsenals and depots to the Naval Ammunition Depot at Earle, New Jersey. There, the material was to be loaded on old Liberty ships, taken to sea, and sunk. As McCarthy stated before Congress in August 1969, he was concerned that during this toxic waste disposal mission "large quantities of nerve gas and mustard gas […]

might accidentally [be] released" with "deadly effects on people living near the railroads," or similarly for the "sailors on vessels near the scene" of disposal. In addition, he also voiced his concern for the "ecology of the ocean" when hazardous material was dumped in "a manner that had not been contemplated" (McCarthy in Congression Records August 12, 1969, 23377).

Following McCarthy's going public with military plans, several parties opposing ocean dumping jumped into action. On May 13, the *New York Times* reported of a resolution unanimous adopted on May 11 by the Monmouth, Ocean, Atlantic, and Cape May Counties, which raised the "urgent question of safety to the people of New Jersey" if army plans were followed through. County mayors urged their congressional representatives "to interpose strenuous objections with the United States Army" (Resolution cited in *New York Times*, May 13, 1969). Simultaneously, Representative Cornelius Gallagher of New Jersey, Chairman of the House Subcommittee on International Organizations and Movements, held hearings on May 8, 13, 14, and 15, 1969 in order to learn more about these shipments scheduled to begin May 16 (House of Representatives 1969, 23377).

This sudden attention and opposition rather surprised the US military. The first hearing of May 8 had to be re-scheduled. The Department of Defense was "not prepared to discuss the disposal plans" yet (House of Representatives 1969, 23377). *Science News* reporters later suggested that this was because, prior to the exposure of Operation CHASE 13 through Congressman McCarthy, the army had not even "solicit[ed] scientific opinion" (Science News 95 1969, 609). Only five days later, on May 13, Acting Assistant Secretary for Research and Development of the US Army, Charles L. Poor, and Dr. Robert A. Frosch, Assistant Secretary for Research and Development of the US Navy appeared as principal witnesses before Congress. Most of their testimony was based on a scientific review held "just four days prior to the Army's appearance before the subcommittee, and after the Army had been summoned to justify its plan" (ibid.). Thus equipped with scientific back-up, they attempted to answer all questions raised by members of Congress concerning the safety of the disposal plans as well as the effects of prior CHASE missions. 12 times so far, unwanted ammunition had been taken to sea, entirely unobserved from the American public, representatives of Congress, or administrative staff from the US State Department or the Department of the Interior. Only hours before the trains of chemical weapons were scheduled to make way towards New Jersey's shore, CHASE 13, the sinking of the Le Baron Russell Briggs was halted (House of Representatives 1969, 23377; *Science News* 95, 1969, 609; Egginton 1969).

Between May 1969 and August 1970, numerous hearings before various subcommittees of the US Congress followed, multiple scientific commissions were formed to evaluate the best practice of weapon disposal, and from late June 1969 onwards, the American media started reporting extensively on the subject. Concerned politicians from both sides of the political aisle were eager

to find out more about the disposal of outdated chemical weapons and possible alternatives to ocean dumping. The Department of Defense, in turn, appeared reluctant to abandon its original plans of scuttling the Le Baron Russell Briggs. Army officials soon grew impatient with the delay imposed upon them and attempted to rush decisions. They claimed that ocean dumping would no longer be feasible later in 1969 due to the beginning of the winter storm season on the North Atlantic. Additionally, it would take three months for some 20 trains to be loaded and moved to Earle, New Jersey, where the ships would be loaded. If the scientific reports were not completed by the end of June 1969, ocean dumping would be ruled out for yet another year (*Science News* 95, 1969, 609).

The Department of Defense's strategy to rush matters along was to sell ocean dumping as the safest best practice for the disposal of these outdated chemical weapons. When in May 1969, Secretaries Poor and Frosch were summoned before Congress, they assured the congressional committee that disposal at sea of unwanted nerve gas and mustard gas was the safest procedure. The ships would be sunk in water about 7,200 feet deep where currents were very slow and the gas would have an opportunity to dissolve over a long period of time. Richard McCarthy quoted Frosch to have said at the time that it would be "at best something over 40 years" before containers could re-surface. Much more likely, the gas would dissolve out "so that it would be in below-detectable trace amounts" (Frosch in House of Representatives 1969, 23377). Both army experts attempted to be re-assuring, moving the risks associated with ocean dumping into some unlikely far-away future.

Selling ocean dumping as safe did not work well for the US military. The Department of Defense followed a poor communication strategy and steadily lost credibility. Poor and Frosch, for instance, reported to Congress about an ocean dumping case when the ship loaded with explosives failed to explode at the planned depth. They did not, however, inform Congress about the case of the SS Village, the second CHASE mission. This ship was loaded with more than 7,000 tons of outdated chemical weapons when scuttled. Five minutes after she was sunk on September 17, 1964, three explosions were felt. An oil slick and debris appeared on the water surface and it was clear that some part of the cargo had detonated. The explosions were large enough to appear on seismic equipment all over the world and soon the US received inquiries about earthquakes along the East coast. At the time, none of this was made public, and, when interrogated before Congress in May 1969, Frosch and Poor still tried to cover it up. McCarthy only happened to come across this information weeks later when he read an article by Steve Kurak, a civilian employee of the Army, in the US Naval Institute Proceedings that briefly mentioned the incident. This breach of trust in addition to the report of a subsequent adhoc committee of the National Academy of Science from June 1969, only confirmed the opposition's doubts and skepticism regarding ocean dumping (Frosch in House of Representatives 1969, 23377; Kurak 1967).

The probability of hazards, or degree of riskiness, of these stockpiles rotting away remained obscure over the months to come. Over the course of 1969 and 1970, no party involved doubted the potential immediate deadliness of these weapons for everyone and everything living within a range of three square kilometers. Dangers seemed particularly prevalent during the transportation of these weapons from their stockpiles all over the United States – and as it later on turned out also Germany and Japan – to their disposal site. Little consensus existed on just how likely accidents were on route to disposal or what immediate and long-term effects exactly the disposal would have. Furthermore, experts, military officials, politicians, and public laymen disagreed fundamentally on what the safest method of disposal could be: ocean dumping, incineration, or an underground nuclear explosion?

5. Potentialities and Likelihoods: Re-Assessing the Risks of Chemical Weapon Disposal

Knowledge seemed to be key in a situation where no exact data was easily procured. On the one hand, the Department of Defense was rather stuck up in providing information on chemical biological warfare to the public. On the other hand, the Pentagon had little to no oceanographic data on the effects of ocean dumping to provide the public with.

Even for Congressman McCarthy, it proved to be exceedingly difficult to breach the overextended walls of Pentagon secrecy. In a meeting before Congress on the American ratification of the Geneva Protocol in early November 1969, McCarthy complained about military information procedures. He emphasized the difficulty of retrieving the right or relevant information on chemical weapons from the Department of Defense or the Department of the Interior. Both, he claimed, did not "too readily come forward with this information." And so, in order to be able to "pick it out, one at a time," those interested in the processes and effects of managing chemical weapons in the United States had to "became almost a scholar, and be so informed that [they knew] the right questions to ask," according to McCarthy (McCarthy in Ninety-First Congress 1969, 41). Passing out such information, however, was a delicate issue, possibly encroaching upon necessary Cold War secrecy. After all, as Congressman Wayne Hays, Democrat from Ohio, pointed out, might be "vital to national security." If the military did not want "the Russians to know" about it, according to Hays, "they had not better tell it to a committee of the Congress, […] because it [would] be in the paper the next day" (Hays in Ninety-First Congress 1969, 42). This did not impress opponents of ocean dumping. "The public has got to know more," urged Kevin Shea, scientific director of the Committee for Environmental Information (Shea in Egginton 1969).

Throughout the ocean dumping crisis, the US military was certainly not the most forthcoming, transparent, or supportive partner for those interested in genuinely assessing the risks of ocean dumping. Opponents of ocean dumping, in turn, doubted that this information policy was necessarily a question of national security. For them, it seemed to show that the Pentagon was not genuinely interested in sharing information or finding an alternative to ocean dumping.

At the same time, some credibility needs to be restored to the Department of Defense. The confusion about the hazardous potentiality of CHASE 13 was not solely a question of military secrecy, but also of lacking information. Neither independent nor army scientists did have exact data at the time on effects of ocean dumping on marine life. This became blatantly obvious over the series of government hearings between May 1969 and August 1970. On May 9, 1969, the US Army summoned Bostwick Kechum as exterior expert to answer questions on pressure effects, speed of descent, diffusion and chemical decay rates, and the effect of bottom currents. After the interrogation, the oceanographer from the National Science Foundation expressed utter "amazement that so little was known" (*Science News* 95, 1969, 609). Gaps in knowledge existed, according to Bostwick in an interview with *Science News* in June 1969, "even in the most obvious areas." The Navy had little data on the terminal velocity of those ships when they hit the bottom or the impact effect on the gas containers and explosive charges. Part of the problem was that, prior to May 9, 1969, the Pentagon had not considered it necessary to collect data on the maritime environment. Four days before Poor and Frosch were summoned before Congress in May 1969, "the Army did not have [any] data" (Bostwick in *Science News* 95, 1969, 609).

The situation of lacking data had not changed much one year later. On August 5, 1970, the US Senate held another hearing on the environmental effects of ocean dumping and biological damage to marine life. Facing a crossfire interrogation from Senator Ernest Hollings, a Democrat from South Carolina, Army spokesman Dr. Cheek crumbled almost immediately. He had to admit not only that the Army had not made "any biological tests off the New Jersey costs," but also had not "participated in any pre-dumping survey of that area" prior to the CHASE missions. Cheek's attempted to save face with the claim that oceanographic photographs concerning older CHASE missions that had been made "in the general area" showed "no evidence […] that there was any measurable or detectable change in the ecology" was unsuccessful. First, he had to admit that these photographs had not been taken at the "exact site." Then he had to reveal that the hulks of some CHASE ships sunk, such as the SS Robert L. Stevenson, "had not been located" (United States Senate 1970, 19; Coast Guard Records 1967). And so it was "difficult to tell how close to the hulk these photographs were taken." Lacking proper maps and estimates of the ocean currents, the Navy could not find many of its CHASE ships again after it had scuttled them at sea. Senator Hollings closed his interrogation with a sneer

at the role of exact science as such: "As a scientist," he said to Cheek, "you are giving exact testimony but the fact is that you haven't found the sunken hulks off the New Jersey coast" (United States Senate 1970, 19). The credibility of Department of Defense, as well as that of its scientific witnesses, was done with after this meeting.

In the months to come, scientists called on from supporters as well as opponents of ocean dumping did little to re-establish a sense of safety among the American public. It seemed that they had lost their scientific authority. In July 1969, scientists from the National Academy of Science officially declared to *Science News* that they "considered themselves inadequately qualified to give an exhaustive study of the problem of disposing of 418 concrete coffins containing M55 nerve gas rockets" (*Science News* 96, 1969, 26). This debate on data and the exactness of oceanographic science between 1969 and 1970 visualized the capricious character and obscurity of this particular risk of ocean dumping chemical weapons. Contemporaries felt that there was no scientific truth to be had to help assess potentialities. A sense of insecurity only grew between late 1969 and summer 1970.

Because of lacking data, a best practice method for disposing this toxic waste was not easily found. After, in May 1969, Operation CHASE 13 had been suspended, various scientists attempted to find the perfect solution to the disposal of these outdated chemical weapons. On June 25, 1969, a panel of scientists from the National Academy of Science recommended that the Army rather dispose of its tons of chemical warfare agents on government installations by means of chemicals or incineration. The shipment cross country and subsequent ocean dumping was not favored (Associated Press 1969). At the same time, the National Academy of Science recommended that the Army "convene a group of technically experts to determine if there was any practical feasible alternative to sea disposal." For a while, scientists discussed the option of disposing the waste material by means of a nuclear underground explosion, but this was opposed by the Atomic Energy Commission. In the summer of 1970, the Department of Defense returned to its original plan of ocean dumping for lack of better alternatives as well as for lack of more time to investigate safer alternatives. Over a year after CHASE 13 had been exposed and "after numerous studies by experts and tests for alternatives," the Army concluded that there was "practically no feasible alternative to dumping the vaults [of chemical weapons] at sea" (Beal in United States Senate 1969, 3). At the same time, military spokesman Thaddeus R. Beal told the US Congress that there was no time to waste because the corroding containers of nerve gas were "becoming more dangerous every day." On August 4, Army Undersecretary Beal told Congress that they must be dumped into the ocean without delay. "Time is of the essence," he said (Beal in *Chicago Tribune* 1970).

In August 1970, the Army brought operation CHASE 13 to conclusion, sticking with its original plan. Two diesel locks were scheduled to pull 12

gondola cars containing the nerve gas rockets set in concrete coffins from the American inland towards North Carolina's coast. Additionally, the train contained 11 cars carrying support troops, guards, medical personnel, fire trucks, and emergency equipment. A pilot train passed half an hour earlier. The containers were then to be loaded on board the Le Baron Russell Briggs, brought out to sea and scuttled.

Making a decision did not re-establish a sense of safety among the American public. Not everyone agreed with the Pentagon's assessment that ocean dumping was "safe" or at least "the safest" option. Several politicians attempted to stop the shipment of the outdated chemical weapons fearing the risks of the transport. The Republican mayor of Macon, Georgia, Ronnie Thompson, threatened a federal court injunction to prevent the train from passing through his city. If the train were not re-routed, Thompson clamored, he would have his 200-man police force stop it at the city limits and arrest "as many people as possible" (Thompson in Lyons 1970). Similarly, Florida's Governor Claud Kirk also talked about seeking a court injunction to stop the operation for fear of the potential damage to Florida's tourist coast (Lyons 1970). Also in North Carolina protesters greeted the trains. In the tiny town of Waxham, anti-war protesters, including an army doctor on leave, held up signs reading "Nerve Gas makes me nervous," or "With Defence like this, who needs enemies?" Camera men from Charlotte, North Carolina's largest city, came especially into this town of 1200. WMAP, the local radio station, broadcasted a junction-by-junction description as the trains passed through (Auerbach 1970). The US public vigilantly followed every move of the Cold War at the home front.

Some civilians and politicians still believed the Pentagon's risk assessment. Georgia's governor, for instance, published statements of trust in the safety of the transport. He volunteered to ride "atop the concrete coffins containing the rockets as the train rides through Georgia" (Lyons 1970). Similarly, protest culture in Waxham, North Carolina, illustrated the lack of a consensus on safety and risk. Most anti-war protesters came from Charlotte, 40 miles away, to greet the trains in the first town they passed through in North Carolina. Meanwhile, towns people had put up signs that said "Good Luck" or "It's nervy, but come on through." The town's police chief stated that citizens were not worried about the gas; they just "didn't want nobody hurt" (Auerbach 1970). Some people seemed to take the train transport like a happening. The town's reverend, James King, noticed that this was the most people he had ever seen at the train station. As the train passed, soldiers waved at girls standing on an overpass. Others flashed a "V" sign for victory at the people. In the evening, one observer was reported stating: "It was a nice outfit that went through! All those soldiers, it was like a parade" (Auerbach 1970). In the small town of Waxham, Americans of all ages, colors, and political and social backgrounds demonstrated insecurity prevalent in the whole country at the time: how risky were those outdated chemical weapons and their disposal after all for their health and the

marine environment? And were they willing to take this unpredictable risk to keep America "safe" from potential Cold War attacks?

6. Conclusion

In this confusion about the potentialities of risks stemming from chemical weapon disposal, the Department of Defense finally determined ocean dumping to be the safest method of all. Still, CHASE 13 became the last ocean dumping mission of toxic waste in US history. Although the question of risk potentialities involved in ocean dumping could not be solved over the course of 1969 and 1970 by means of science, the Department of Defense gave way to other pressures. It realized that "public concern about the dumping [was] very real" – scientifically sustainable or not. Pressures stemming from worried action groups and politicians were too strong to continue with old practices. In August 1970, the Pentagon promised that after this final ocean dumping mission, CHASE 13, there would be "no more dumping of defective poison gas weapons in the ocean and no more carrying them around the country, scaring the populace." In February 1971, Defense Secretary Melvin R. Laird officially announced that "in a move to protect the environment," the Army banned the "dumping of obsolete gas and explosive weapons into the ocean." Only some months later, the international community passed the London Dumping Convention of 1972, prohibiting the very same action on a global level.

While this might be a fairy-tale ending for environmentalism in its concern for maritime space, future events soon showed that structures and dynamics in managing the risks of chemical weapons would not change. The US military's environmental concern did not last. It also did not abandon the production or stockpiling of chemical weapons. It only attempted to make them "safer." In 1973, the Pentagon announced that it would spend $200 million dollars on the production of a new type of nerve gas, known as binary gas. New chemical weapons would contain two nerve gas agents, which were closely resembling insecticides and relatively harmless when separate. Only when combined they produced the lethal nerve gas. Such binary weapons would be much "far safer" to handle, transport, and store. The Army hoped that this would alleviate the public's concern that had followed Operation CHASE. At the time, the Department of Defense concealed that it would have to spend the same amount of money on the disposal of its old stockpile.

Risks and risk management are not clear-cut, in particular when it concerns hazardous objects. To this day, the United States, just as other military nations all around the world, has an ambivalent relationship to chemical warfare and the management and disposal of chemical weapons. They oscillate between their ambition to manage the risk and to keep themselves and their environment safe from harm. While this ambivalence is integral to any military conflict, it

was particularly apparent during the Cold War, which was in particular during the 1960s and 1970s – as this chapter showed – a continuous struggle of risk assessment and risk management.

References

Adam Rome. 2003. 'Give Earth a Chance': The Environmental Movement and the Sixties. *The Journal of American History* 90 (2): 525-54.

Associated Press. 1969. Poison Gas Dumping Rejected by Panel. *New York Times*, June 26.

Auerbach, Stuart. 1970. Mixed Reception Greets Gas Trains in N.C. Town. *Washington Post*, August 12.

Burr, William, and Jeffrey P. Kimball. 2015. Nixon's Nuclear Specter: The Secret Alert of 1969, Madman Diplomacy, and the Vietnam War. Lawrence: University Press of Kansas.

Campbell, Velma L., and Vincent, J. Ross. 1995. Chemical Weapons Destruction: A Window of Opportunity. *Social Justice* 22 (4): 114-25.

Chicago Tribune. 1970. Tell Danger in Not Dumping Gas Rockets, August 4.

Christianson, Scott. 2010. *Fatal Airs: The Deadly History and Apocalyptic Future of Lethal Gases that Threaten our World*. Santa Barbara: Praeger.

Closmann, Charles E. 2009. *War and the Environment: Military Destruction in the Modern Age*. College Station: Texas A & M University Press.

Cookson, J., and J. Nottingham. 1969. *A Survey of Chemical and Biological Warfare*. New York: Monthly Review Press.

Department of Defense, Department of the Navy, Naval Photographic Center. 1970. *Operation CHASE: Sinking of SS L.B. Briggs, August 18, 1970*. US National Archives.

Egginton, Joyce. 1969. US Shock over Army Plan to send Horror Gas by Train. *The Observer*, June 8.

Environmental Protection Agency. 1973. *Recommended Methods of Reduction, Neutralization, Recovery or Disposal of Hazardous Waste*. Washington, DC.

Futrell, Robert. 1997. Citizen-State Interaction and the Technical Controversy: The U.S. Army Chemical Stockpile Disposal Program. *Social Thought and Research* 20 (1-2): 129-68.

Futrell, Robert. 2003. Technical Adversarialism and Participatory Collaboration in the U.S. Chemical Weapons Disposal Program. *Science, Technology, & Human Values* 28 (4): 451-82.

Johnson, Lyndon B. 1965. Remarks at the University of Michigan, May 2, 1964. In *Public Papers of the Presidents of the United States: Lyndon B. Johnson, 1963-1964*, 704-5. Washington.

Keith M. Woodhouse. 2009. The Politics of Ecology: Environmentalism and Liberalism in the 1960s. *Journal for the Study of Radicalism* 2 (2): 53-84.

Krass, A. S. 1997. *The United States and Arms Control: The Challenge of Leadership*. Santa Barbara: Praeger.

Kurak, Steve. 1970. Operation CHASE. In *United States Senate, Dumping of Nerve Gas Rockets in the Ocean: Hearing before the Subcommittee on Oceanography*

of the Committee on Commerce, Ninety-First Congress, Second Session, August 5.
Kurak, Steve. 1967. Operation CHASE. In *Proceedings of the US Naval Institute*.
Lyons Richard. August 6, 1970. Dumping of Gas Weapons in Sea Won't Be Repeated, Army Says. In Washington Post.
Marrs, T. T., R. L. Maynard, and F. Sidell. 2007. *Chemical Warfare Agents: Toxicology and Treatment*. Chichester: John Wiley & Sons.
Matthew, Richard A. 2013. Environmental Security. In *Environmental Policy: New Directions for the Twenty-First Century*, ed. Norman J. Vig, 344-67. Thousand Oaks: CQ Press.
McCarthy, Richard D. 1969. *The Ultimate Folly: War by Pestilence, Asphyxiation and Defoliation*. New York: Vintage Books.
McNeill, John R., and Corinna R. Unger, eds. 2010. *Environmental Histories of the Cold War*. Washington, DC and New York: German Historical Institute; Cambridge University Press.
Mohun, Arwen. 2013. *Risk: Negotiating Safety in American Society*. Baltimore: Johns Hopkins University Press.
Muskie, Edmund. 1969. Senator Calls for Action: Time to Control Poison Gas. *Boston Globe*, June 22.
New York Times. 1970. Furor over Plan to Dump Nerve Gas, August 9.
New York Times. 1981. Army flies 128 Nerve Gas Bombs to Utah Facility, August 13.
Payne, Keith B. 2001. *The Fallacies of Cold War Deterrence and a New Direction*. Lexington: University Press of Kentucky.
Price, Richard. 1995. A Genealogy of the Chemical Weapons Taboo. *International Organization* 49 (1): 73.
Rome, A. 2001. *The Bulldozer in the Countryside: Suburban Sprawl and the Rise of American Environmentalism*. Cambridge: Cambridge University Press.
Ross, Benjamin, and Steven Amter. 2010. *The Polluters: The Making of Our Chemically Altered Environment*. Oxford: Oxford University Press.
Schelling, T. C. 1966. *Army and Influence*. New Haven: Yale University Press.
Science News. 1969. NAS suggests Modifications. *Science News* 96 (2): 26.
Selin, Henrik, and Stacy D. VanDeveer. 2013. Global Climate Change: Beyond Kyoto. In *Environmental Policy: New Directions for the Twenty-First Century*, ed. Norman J. Vig, 278-98. Thousand Oaks: CQ Press.
Smothers, Ronald. 1994. Plan to Destroy Toxic Weapons Polarizes City. *New York Times*, September 24.
Tanzman, Edward. 1994. Environmental and Safety Obligations of the Chemical Weapons Convention. *Proceedings of the Annual Meeting (American Society of International Law)* 88 (April): 226-30.
Tucker, Richard P., and Edmund Russell. 2004. *Natural Enemy, Natural Ally: Toward an Environmental History of Warfare*. Corvallis: Oregon State University Press.
United Nations. 1925. *Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare*. Geneva.
United States Army Research, Development and Engineering Command, Historical Research and Response Team. 2001. *Off-Shore Disposal of Chemical Agents and*

Weapons Conducted by the United States. Aberdeen Proving Ground, MD: US Army.
United States Coast Guard Records, Office of Operations, Port Security and Law Enforcement Division. 1967. *Correspondence, 1947-1971. Operation CHASE VI, West Coast*. US National Archives.
United States House of Representatives. 1969. *Congressional Record – House, August 12, 1969*. Library of Congress.
United States Ninety-First Congress. 1970. *Chemical-Biological Warfare: U.S. Policies and International Effects: Hearings before the Subcommittee on National Security Policy and Scientific Developments of the Committee on Foreign Affairs, House of Representatives*. Washington DC: US Government Printing Office.
United States Senate. 1970. *Dumping of Nerve Gas Rockets in the Ocean: Hearing before the Subcommittee on Oceanography of the Committee on Commerce, United States Senate, Ninety-First Congress, Second Session, August 9, 1970*. Library of Congress.
Vig, Norman J., ed. *Environmental Policy: New Directions for the Twenty-First Century*. Thousand Oaks: CQ Press.
Weiner, T. 2015. *One Man Against the World: The Tragedy of Richard Nixon*. New York: Henry Holt and Company.
Welch, David A. 2005. *Painful Choices: A Theory of Foreign Policy Change*. Princeton: Princeton University Press.